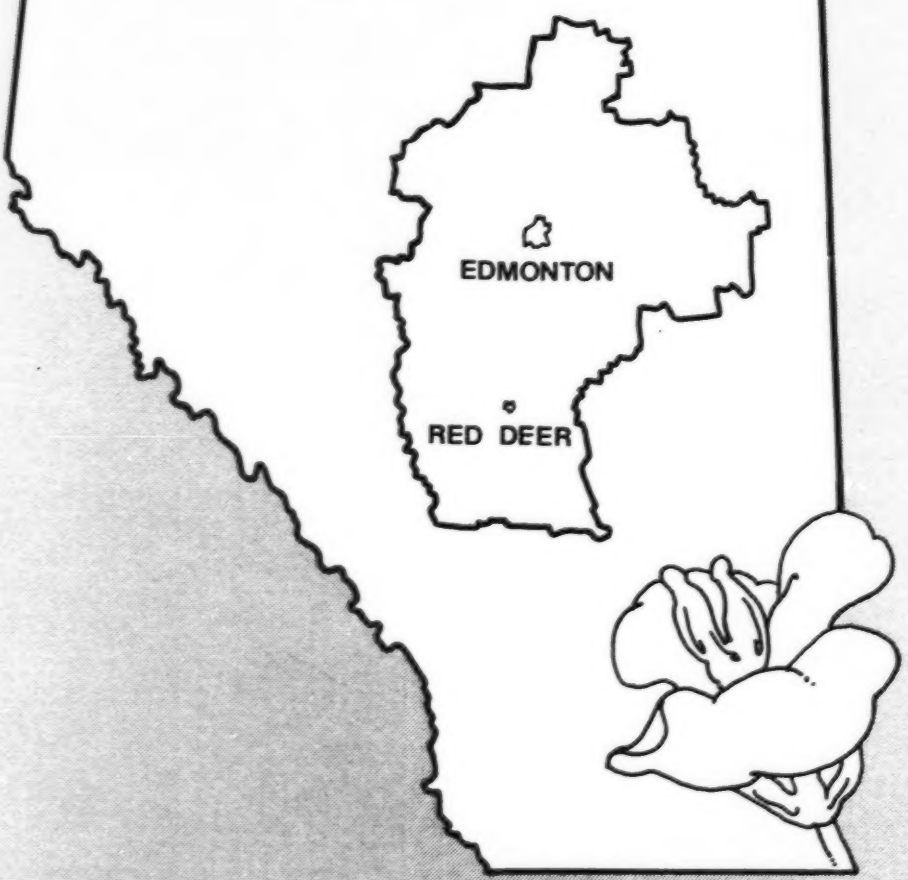
# canola production survey results

Alberta
AGRICULTURE
Field Crops Branch
Lacombe, Alberta



# A C K N O W L E D G E M E N T

The author wishes to express a sincere thank you to the Extension Division, Alberta Agriculture, in particular the District Agriculturists who selected the producers and oversaw the completion of the questionnaires; to Mr. C. E. Sterling of the Statistics Branch for his assistance in planning, implementation, data compilation, and analyses.

A special thank you to all the producers who gave so freely of their time and information.

Phil Thomas
Supervisor, Oilseed Crops
Field Crops Branch
Alberta Agriculture

## CANOLA PRODUCTION SURVEY

### INTRODUCTION

During the late fall of 1981, and early winter of 1982, an extensive survey was conducted, covering the dark brown, thin black, black and grey-wooded soil zones of Central Alberta. Two hundred and ninety-seven above-average canola growers were selected by their District Agriculturists to complete a forty-one page questionnaire dealing with all aspects of their canola production practices. The producers were asked to select one of their canola fields and answer questions regarding all treatments the field received for the production of the 1981 crop.

With the help of the Statistics Branch, Alberta Agriculture, the number of producers selected from any one District Agriculturist area was proportionate to the amount of canola that area contributes to the average provincial production. In this way the analysis of producer techniques would statistically represent the canola producers of Central Alberta.

To help interpret and analyze the data for those management factors which determine high canola yields, a LOW group (average 21 bushels per acre) and a TOP group (average 40 bushels per acre) were selected from the two hundred and ninety-seven producers in the SURVEY (average 30 bushels per acre). Note that the LOW yield group in this survey still achieved near the provincial five-year average yield (approximately 21 bushels per acre).

The effect of abnormal rainfall and disease damage, which could mask management factors, were eliminated from the data presented in this report by selecting only those farms which received adequate rainfall throughout the growing season and did not report moderate to heavy disease damage.

## Rainfall Patterns for Survey Producers

Rainfall varied considerably throughout the area surveyed, ranging from less than 2 inches during the growing season to greater than 18 inches. The majority of the producers (90%) received greater than 6 inches of rain, as shown in the following (this data does not include those producers who reported moderate to heavy disease damage):

### Rainfall During the Growing Season

| Inches of Rainfall | Percent of Survey | Average Yield |
|---|---|---|
| Up to 2 inches | 1 | 23 |
| 3 to 5 inches | 9 | 24 |
| 6 to 8 inches* | 27 | 29 |
| 9 to 11 inches* | 20 | 30 |
| 12 to 14 inches* | 21 | 31 |
| 15 to 17 inches* | 13 | 30 |
| Over 18 inches* | 9 | 31 |

### Rainfall Effects on Canola on Summerfallow or Stubble

| | Average Yield On | |
|---|---|---|
| Inches of Railfall | Summerfallow | Stubble |
| Up to 2 inches | 25 | 21 |
| 3 to 5 inches | 30 | 21 |
| 6 to 8 inches* | 33 | 28 |
| 9 to 11 inches* | 31 | 29 |
| 12 to 14 inches* | 36 | 30 |
| 15 to 17 inches* | 29 | 31 |
| Over 18 inches* | - | 33 |

* Data used in the Survey Report.

Average yield was similar for those canola fields receiving over 6 inches of moisture during the growing season. Summerfallow, with its higher moisture reserves, provided higher yields with only 3 to 5 inches of rainfall, whereas canola on stubble, with less than 5 inches, had significantly reduced yields.

Both the Polish and Argentine varieties responded similarily to rainfall during the growing season.

Distribution of rainfall during the growing season was similar for the LOW group, the TOP group and the SURVEY, with an average of 1.2 inches in May; 2.8 inches in June; 4.7 inches in July, and one inch in August. The TOP group received more rain only in the month of May than did the LOW or SURVEY.

Disease Patterns for Survey Producers with Adequate Rainfall

| Varieties | Percent of Survey | Average Yield |
|---|---|---|
| Polish - no moderate to heavy disease damage reported | 61* | 30 |
| Polish - moderate to heavy disease damage reported | 8 | 26 |
| Argentine - no moderate to heavy disease damage reported | 23* | 30 |
| Argentine - moderate to heavy disease damage reported | 8 | 24 |

Since diseases could mask management factors, the data presented in this report are from those producers reporting no moderate to heavy disease damage. The disease sclerotinia for example causes its heaviest damage in those crops which have the highest yielding potential and have received the best management.

# CANOLA SURVEY RESULTS

Districts Surveyed - Canola producers were selected from the following 23 D.A. districts:

| D. A. District | Average Yield | Yield Range |
|---|---|---|
| Athabasca † | 26 | 18 - 35 |
| Barrhead *† | 26 | 20 - 40 |
| Westlock *† | 30 | 15 - 48 |
| Thorhild † | 28 | 20 - 30 |
| Smoky Lake * | 27 | 22 - 35 |
| Morinville *† | 28 | 20 - 34 |
| Lamont *† | 27 | 10 - 35 |
| Two Hills * | 34 | 23 - 42 |
| Stony Plain *† | 32 | 25 - 45 |
| Strathcona *† | 29 | 15 - 37 |
| Ryley * | 32 | 22 - 35 |
| Vegreville | 31 | 25 - 42 |
| Leduc *† | 26 | 9 - 35 |
| Wetaskiwin *† | 35 | 20 - 50 |
| Camrose † | 29 | 18 - 30 |
| Rimbey * | 32 | 23 - 35 |
| Ponoka *† | 29 | 20 - 40 |
| Rocky Mountain House † | 31 | 20 - 34 |
| Lacombe *† | 30 | 12 - 46 |
| Red Deer * | 29 | 22 - 45 |
| Innisfail * | 33 | 25 - 42 |
| Olds *† | 34 | 25 - 43 |
| Three Hills * | 39 | 30 - 45 |

* TOP group - † LOW group

Number of D.A. districts represented in both the LOW group and TOP group were similar as shown above. Therefore, the data represents a good cross-section of the total area surveyed. There was a large range in yields in all D.A. districts.

The data in this report will be presented under the designation "LOW", "TOP" and "SURVEY".

| | LOW | TOP | SURVEY |
|---|---|---|---|
| Average number of cultivated acres per farm | 1019 | 1169 | 1066 |
| Average Canola acreage | 217 | 180 | 220 |
| Average years experience growing canola | 12 | 12 | 13 |
| Proportion of Seed Growers | 5% | 20% | 6% |

Rotations: Canola was sown on summerfallow land by 28% of the survey.

| Crop Rotation Used | | | | | | Summerfallow Portion of |
|---|---|---|---|---|---|---|
| 1977 | 1978 | 1979 | 1980 | LOW % | TOP % | SURVEY % |
| CE | CE | CE | SF | 45 | 75 | 42 |
| SF | CE | CE | SF | - | 5 | 6 |
| CE and/or | FO | FO | SF | 5 | 5 | 7 |
| CE and/or | FO | CE | SF | 5 | - | 5 |
| CA | CE | CE | SF | 15 | - | 16 |
| CA | SF | CE | SF | 5 | 5 | 2 |
| SF and/or | CE | CA | SF | 10 | 10 | 15 |
| SF and/or | CE | CA | SF | 10 | - | 4 |
| CA | CE | CA | SF | - | - | 1 |
| SF | CA | CA | SF | 5 | - | 2 |

CE = Cereals; SF = Summerfallow; FO = Forages, and CA = Canola.

45% of the LOW group seeded their canola on summerfallow which had a previous crop of canola in the previous 4 years compared to only 15% of the TOP group and 40% of the SURVEY.

Seventy-two percent of the canola in the survey was grown on stubble.

| Crop Rotation Used | | | | | | |
|---|---|---|---|---|---|---|
| 1977 | 1978 | 1979 | 1980 | LOW % | TOP % | SURVEY % |
| CE | CE | CE | CE | 15 | 30 | 14 |
| FO and/ | FO | FO | FO | - | - | 2 |
| CE or FO and/ | | FO | CE | 20 | - | 6 |
| CE or FO and/ | | FO | FO | - | - | 3 |
| SF or CE | | CE | CE | 20 | 10 | 10 |
| CA | CE | CE | CE | - | 15 | 10 |
| CE | CA | CE | CE | 20 | 30 | 23 |
| CE | CE | CA | CE | - | 5 | 6 |
| CA | CE | CA | CE | - | 10 | 6 |
| CE &/or SF &/or | FO | CA | FO | - | - | 1 |
| CE &/or SF &/or | FO | FO | CA | 15 | - | 9 |
| CE | CA &/or CE | | CA | - | - | 2 |
| CE | CA | CE | CA | - | - | 1 |
| CA &/or SF &/or CE &/or FO | | | | 10 | - | 6 |

Although the TOP group had a higher percentage of their rotations with canola in the previous 4 years (60%) than the LOW (45%), they did not sow any canola on canola stubble versus 15% of the LOW group.

Producers in the survey who seeded their canola on a summerfallow or stubble rotation which did not have canola in the previous four years had a higher average yield (30 bu/ac) than those that did (28 bu/ac) and the percentage of producers who reported moderate to heavy disease damage was lower where a canola crop was not grown in the previous four years (14%) than where it was (19%).

| SOIL TYPE | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| BLACK | 40 | 63 | 54 | 31 bu/ac. |
| THIN BLACK | 23 | 25 | 24 | 30 " |
| DARK BROWN | 5 | 5 | 2 | 35 " |
| GREY-WOODED | 32 | 7 | 20 | 28 " |

A greater percentage of the LOW group grew their canola on grey-wooded soils; however, the average yield for the survey producers on grey-wooded soils was not that greatly different than those yields for other soil types.

| | AVERAGE YIELD ON EACH SOIL TYPE | | | |
|---|---|---|---|---|
| VARIETIES | BLACK | THIN BLACK | DARK BROWN | GREY WOODED |
| Polish on summerfallow | 31 | 31 | 37 | 30 |
| Argentine on summerfallow | 35 | 34 | - | 24 |
| Polish on stubble | 30 | 29 | 33 | 29 |
| Argentine on stubble | 30 | 29 | - | 23 |

The above yields for Polish varieties on Grey-wooded were nearly the same as for Black and Thin Black soil types; however, the Argentine varieties showed a great yield reduction on Grey-wooded soils. Therefore, choice of variety is very important on Grey-wooded soils. The LOW group grew a higher percentage of Argentine varieties than the TOP group, as will be shown later.

| SOIL TEXTURE | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Coarse | - | - | 2 | 29 |
| Medium | 60 | 50 | 63 | 29 |
| Fine | 20 | 45 | 22 | 29 |
| Very Fine | - | - | 1 | 29 |
| Organic-Peaty | - | - | 2 | 27 |
| Don't Know | 20 | 5 | 10 | 27 |

The LOW group had a higher percentage that said they didn't know what their soil texture was. Average yields for all soil textures except organic-peaty textures were the same at 29 bushels/acre.

SOIL PROBLEMS: The majority of the producers reported few soil problems; however, a few reported moderate to severe soil problems.

| SOIL PROBLEM | LOW | TOP | SURVEY |
|---|---|---|---|
| Solonetzic | 5 | - | 2 |
| Acid Soil | 5 | 5 | 1 |
| Crusting | 5 | 10 | 7 |
| Wind Erosion | 5 | - | 3 |
| Water Erosion | - | - | 1 |
| Poor Drainage | 5 | 5 | 4 |
| Micro-Nutrient Deficiency | 10 | - | 3 |

The LOW group reported more moderate to severe soil problems than the TOP group or the SURVEY.

| TYPE OF TILLAGE PROGRAM USED | LOW | TOP | SURVEY |
|---|---|---|---|
| Conventional Tillage | 95 | 75 | 94 |
| Minimum Tillage | 5 | 25 | 6 |
| Zero Tillage | - | - | - |

The TOP group practices more minimum tillage.

FIELD OPERATIONS

I: Summerfallow Fall Operations After August 1st.

| ALL EQUIPMENT: TIMES OVER FIELD | LOW | TOP | SURVEY |
|---|---|---|---|
| 0 | 5 | 20 | 7 |
| 1 | 30 | 5 | 19 |
| 2 | 35 | 25 | 32 |
| 3 | 20 | 35 | 25 |
| 4 | 10 | 5 | 11 |
| 5 + | - | 10 | 6 |
| Average Number | 2.0 | 2.4 | 2.3 |
| TILLAGE EQUIPMENT: TIMES OVER FIELD | | | |
| 0 | 5 | 25 | 11 |
| 1 | 30 | 15 | 24 |
| 2 | 40 | 40 | 40 |
| 3 | 25 | 15 | 20 |
| 4 + | - | 5 | 6 |
| Average Number | 1.9 | 1.6 | 1.9 |

The TOP group goes over their summerfallow in the fall more times than the LOW group; however, the TOP group uses fewer passes on the average with tillage equipment (cultivators and double discs) and more passes with harrows, fertilizer and herbicide applicators as shown by the equipment used:

| EQUIPMENT USED | LOW | TOP | SURVEY |
|---|---|---|---|
| H.D. Cultivator (spikes) | 10 | 10 | 15 |
| H.D. Cultivator (sweeps) | 25 | 40 | 28 |
| Vibra-shank cultivator | 65 | 30 | 54 |
| Double Disc | 15 | 15 | 14 |
| Rod-Weeder | 10 | 10 | 5 |
| Harrows | 10 | 25 | 7 |
| Fertilizer Granules applicator | 10 | 15 | 6 |
| Herbicide Granules applicator | 10 | 15 | 8 |
| Herbicide Liquid applicator | - | 10 | 12 |
| Anhydrous applicator | 10 | 20 | 8 |
| Plow | 5 | - | 1 |

Depth of Tillage Equipment Used:

| Inches | LOW | TOP | SURVEY |
|---|---|---|---|
| 2 - 4 | 53 | 78 | 63 |
| 4 - 6 | 43 | 22 | 36 |
| Over 6 | 4 | - | 1 |

A greater proportion of the LOW group work their fields deeper with tillage equipment than the TOP group.

II: STUBBLE FALL OPERATIONS

ALL EQUIPMENT:

| TIMES OVER FIELD | LOW | TOP | SURVEY |
|---|---|---|---|
| 0 | 15 | 5 | 4 |
| 1 | 15 | 15 | 19 |
| 2 | 25 | 15 | 22 |
| 3 | 25 | 25 | 26 |
| 4 | 10 | 15 | 14 |
| 5 + | 10 | 25 | 15 |
| Average Number | 2.3 | 3.2 | 2.8 |

TILLAGE EQUIPMENT:

| TIMES OVER FIELD | LOW | TOP | SURVEY |
|---|---|---|---|
| 0 | 15 | 5 | 4 |
| 1 | 40 | 25 | 25 |
| 2 | 30 | 30 | 40 |
| 3 | 15 | 15 | 20 |
| 4 + | - | 25 | 11 |
| Average Number | 1.7 | 2.3 | 2.2 |

The TOP group went over their stubble in the fall more times with all equipment and also with their tillage equipment than did the LOW group. The TOP group used more cultivators and more fertilizer and herbicide applicators in the fall.

| EQUIPMENT USED | LOW | TOP | SURVEY |
|---|---|---|---|
| H.D. Cultivator (spikes) | 55 | 70 | 57 |
| H.D. Cultivator (sweeps) | 10 | 20 | 26 |
| Vibra-shank Cultivator | 15 | 20 | 16 |
| Double Disc | 30 | 35 | 37 |
| Rod-Weeder | - | 5 | > 1 |
| Harrows | 15 | 10 | 8 |
| Fertilizer granular applicator | 10 | 5 | 10 |
| Fertilizer liquid applicator | - | 5 | 1 |
| Herbicide granular applicator | 10 | 5 | 10 |
| Herbicide liquid applicator | - | 15 | 10 |
| Anhydrous applicator | 40 | 50 | 36 |
| Plow | 10 | 10 | 13 |

Depth of Tillage Equipment Used:

| Inches | LOW | TOP | SURVEY |
|---|---|---|---|
| 2 - 4 | 28 | 27 | 33 |
| 4 - 6 | 64 | 68 | 58 |
| Over 6 | 8 | 4 | 9 |

There was little difference between the groups on the depth of tillage equipment used for fall stubble operations.

As shown above the TOP group applies more fertilizer and herbicides in the fall. This is clearly shown in the following:

| | % LOW | % TOP | % SURVEY |
|---|---|---|---|
| Fall Nitrogen Applied | 35 | 70 | 39 |
| Fall Herbicides Applied | 5 | 30 | 21 |

Twice as many of the TOP producers applied fertilizer and six times as many TOP producers applied herbicide in the fall as did the producers in the LOW group.

## III: SPRING FIELD OPERATIONS ON SUMMERFALLOW LAND

ALL EQUIPMENT:

| TIMES OVER FIELD | LOW | TOP | SURVEY |
|---|---|---|---|
| 0 | - | 5 | 2 |
| 1 | - | 15 | 4 |
| 2 | 25 | 15 | 18 |
| 3 | 25 | 15 | 27 |
| 4 | 25 | 25 | 24 |
| 5 | 15 | 20 | 22 |
| 6 | 10 | 5 | 2 |
| 7 + | - | - | 1 |
| Average Number | 3.6 | 3.2 | 3.5 |

TILLAGE EQUIPMENT:

| TIMES OVER FIELD | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| 0 | 5 | 10 | 5 | 34 |
| 1 | 10 | 25 | 13 | 37 |
| 2 | 50 | 25 | 47 | 31 |
| 3 | 30 | 35 | 33 | 32 |
| 4 + | 5 | 5 | 2 | 32 |
| Average Number | 2.2 | 2.0 | 2.2 | |

The LOW group went over their summerfallow in the spring with all equipment more times on the average than did the TOP group, with slightly more passes of tillage equipment and slightly more passes of other equipment like harrows, fertilizer and herbicide applicators. The TOP group used more packers while the LOW group used none. The highest average yields in the SURVEY was from those with the fewest tillage operations in the spring.

| EQUIPMENT USED | LOW | TOP | SURVEY |
|---|---|---|---|
| H.D. Cultivator (spikes) | - | - | 1 |
| H.D. Cultivator (sweeps) | 5 | 15 | 19 |
| Vibra-Shank Cultivator | 80 | 55 | 68 |
| Double Disc | 40 | 30 | 35 |
| Discer | 5 | - | >1 |
| Rod-Weeder | 15 | 25 | 13 |
| Harrows | 50 | 40 | 39 |
| Packers | - | 15 | 13 |
| Fertilizer granular applicator | 15 | 15 | 14 |
| Fertilizer liquid applicator | 10 | 5 | 6 |
| Herbicide granular applicator | 5 | 5 | 2 |
| Herbicide liquid applicator | 60 | 55 | 64 |
| Anhydrous applicator | 15 | - | 15 |

Depth of Tillage Equipment Used:

| Inches | LOW | TOP | SURVEY |
|---|---|---|---|
| Up to 3 | 35 | 36 | 44 |
| 3 - 4 | 51 | 53 | 44 |
| 4 - 5 | 8 | 11 | 11 |
| 5 - 6 | 6 | - | 1 |

There was little difference between groups on the depth equipment was used for spring field operations on summerfallow land.

IV: SPRING FIELD OPERATIONS ON STUBBLE LAND

ALL EQUIPMENT:

| TIMES OVER FIELD | LOW | TOP | SURVEY |
|---|---|---|---|
| 1 | 5 | 10 | 6 |
| 2 | 15 | 15 | 12 |
| 3 | 25 | 15 | 19 |
| 4 | 25 | 20 | 23 |
| 5 | 20 | 10 | 16 |
| 6 | 5 | 20 | 15 |
| 7 + | 5 | 5 | 9 |
| Average Number | 3.8 | 4.0 | 4.1 |

TILLAGE EQUIPMENT:

| TIMES OVER FIELD | LOW | TOP | SURVEY | AVG. YIELD |
|---|---|---|---|---|
| 0 | - | - | 1 | 33 |
| 1 | 15 | 30 | 17 | 32 |
| 2 | 35 | 25 | 33 | 30 |
| 3 | 40 | 35 | 33 | 30 |
| 4 + | 10 | 10 | 16 | 28 |
| Average Number | 2.5 | 2.3 | 2.5 | |

The TOP group on the average went over their stubble fields slightly more than the LOW group but used less tillage equipment and more other equipment such as harrows; rod-weeders; packers,and herbicide applicators. As with summerfallow, the highest average yields in the SURVEY was from those with the fewest tillage operations in the spring.

| EQUIPMENT USED | LOW | TOP | SURVEY |
|---|---|---|---|
| H.D. Cultivator (spikes) | 15 | 15 | 8 |
| H.D. Cultivator (sweeps) | 20 | 35 | 27 |
| Vibra-Shank Cultivator | 70 | 65 | 67 |
| Double Disc | 30 | 30 | 36 |
| Discer | 10 | - | 2 |
| Rod-Weeder | 5 | 15 | 13 |
| Harrows | 20 | 65 | 46 |
| Packers | 10 | 20 | 12 |
| Fertilizer granular applicator | 15 | 5 | 19 |
| Fertilizer liquid applicator | - | - | 4 |
| Herbicide granular applicator | 15 | 10 | 10 |
| Herbicide liquid applicator | 45 | 60 | 60 |
| Anhydrous applicator | 20 | 30 | 28 |

The TOP group used more rod-weeders; harrows; packers, and herbicide and anhydrous applicators.

Depth of Tillage Equipment Used:

| Inches | LOW | TOP | SURVEY |
|---|---|---|---|
| Up to 3 | 37 | 43 | 43 |
| 3 - 4 | 37 | 38 | 39 |
| 4 - 5 | 22 | 15 | 17 |
| 5 - 6 | 4 | - | 2 |

The LOW group on the average worked their stubble land deeper in the spring than did the TOP group.

The TOP group used more attachments on their tillage equipment especially harrows. Other attachments used were herbicide and fertilizer applicators and packers.

| Tillage Equipment Equipped with Harrows | LOW | TOP | SURVEY |
|---|---|---|---|
| Fall Stubble | 67 | 79 | 72 |
| Fall Summerfallow | 70 | 83 | 60 |
| Spring Stubble | 75 | 80 | 73 |
| Spring Summerfallow | 68 | 100 | 79 |

SEEDBED FIRMNESS

I: Summerfallow Land

| Seedbed Firmness | LOW | TOP | SURVEY | Avg. Yield |
|---|---|---|---|---|
| Very Firm | 11 | 5 | 13 | 33 |
| Firm | 16 | 15 | 22 | 33 |
| Slightly Firm | 32 | 20 | 26 | 31 |
| Slightly Loose | 20 | 35 | 25 | 33 |
| Loose | 20 | 25 | 14 | 33 |

II: Stubble Land

| Seedbed Firmness | LOW | TOP | SURVEY | Avg. Yield |
|---|---|---|---|---|
| Very Firm | 5 | 11 | 10 | 31 |
| Firm | 26 | 58 | 39 | 31 |
| Slightly Firm | 32 | 11 | 25 | 29 |
| Slightly Loose | 37 | 16 | 20 | 27 |
| Loose | - | 5 | 6 | 26 |

Seedbed firmness was not critical for summerfallow land and average yields were similar for all seedbeds.

Seedbed firmness was very critical for stubble land and the TOP group achieved a much higher percentage of their seedbeds as very firm and firm versus the LOW group. This corresponds to the type of equipment used, number of times over field and depth used by the TOP group.

Depth of Soil Moisture from Surface at Time of Seeding:

| | LOW | TOP | SURVEY |
|---|---|---|---|
| Surface to one inch | 65 | 75 | 68 |
| One inch to two inches | 15 | 20 | 13 |
| Over two inches | 20 | 5 | 19 |

More TOP producers maintained soil moisture near the surface to enhance seed germination.

Rate Seedbed Achieved:

| | LOW | TOP | SURVEY |
|---|---|---|---|
| Poor | - | - | 6 |
| Good | 35 | 15 | 18 |
| Very Good | 45 | 45 | 36 |
| Excellent | 20 | 40 | 40 |

More TOP producers rated their seedbeds as excellent.

Date of Seeding:

Argentine Varieties

| Seeding Date | LOW | TOP | SURVEY |
|---|---|---|---|
| Before May 16th | 56 | 72 | 71 |
| After May 16th | 44 | 28 | 29 |

More TOP producers seeded their Argentine varieties before May 16th than did the LOW group. Research results have shown that seeding Argentine varieties in the first two weeks of May leads to the highest yields possible.

Polish Varieties

| Seeding Date | LOW | TOP | SURVEY |
|---|---|---|---|
| Before May 16th | 28 | 32 | 32 |
| May 17 - May 23rd | 23 | 27 | 30 |
| May 24 - May 30th | 23 | 27 | 21 |
| After May 30th | 27 | 14 | 17 |

More TOP producers (54%) seeded their Polish varieties between May 17th and May 30th than did the LOW group (46%). Research results have shown that seeding Polish varieties in the last two weeks of May leads to the highest yields possible.

Equipment Used to Seed:

| I: Argentine Varieties | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Double Disc Press | 71 | 22 | 57 | 28 |
| Double Disc (no press) | - | - | 10 | 30 |
| Hoe Press | 24 | 33 | 21 | 29 |
| Hoe Drill (no press) | - | 6 | 1 | 35 |
| Airflow | - | 22 | 7 | 36 |
| Broadcast | 5 | 17 | 4 | 37 |
| Fertilizer applicator attached to seeder | 88 | 72 | 85 | |
| Harrows attached to seeder | 5 | 50 | 17 | |
| Other equipment used with or attached to seeder | 12 | 22 | 9 | |

The TOP group used more airflow seeders, hoe press drills and broadcast seeding for Argentine varieties than did the LOW group, or the SURVEY. Most of the airflow, hoe drills (no press) and broadcast seeders had harrows attached accounting for the 50% in the TOP group with harrows attached. The TOP group had more "other" equipment used (mostly packers) than did the LOW group. The highest average yields

occurred with airflow seeders and broadcast seeding.

| II: Polish Varieties | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Double Disc Press | 50 | 80 | 59 | 31 |
| Double Disc (no press) | 18 | 5 | 11 | 28 |
| Hoe Press | 23 | 10 | 16 | 29 |
| Hoe Drill (no press) | 5 | - | 3 | 26 |
| Airflow | 8 | 5 | 6 | 26 |
| Broadcast | - | - | 4 | 31 |
| Discer | - | - | 1 | 35 |
| Fertilizer applicator attached to seeder | 68 | 86 | 75 | |
| Harrows attached to seeder | 23 | 32 | 21 | |
| Other equipment with/or attached to seeder | 14 | 41 | 16 | |

The TOP group used more double disc press drills for more accurate placement of the smaller seeded Polish varieties.

More TOP producers used harrows and other equipment (mainly packers) attached to the seeder to help conserve seedbed moisture, promote seed-soil contact, and to level and pack the soil. The highest average yields occurred with double disc press drills and broadcast seeders (although the discer had the highest average yield, there were only a couple of producers who seeded their Polish varieties with it and were obviously successful).

DEPTH OF SEED PLACEMENT:

I: Argentine Varieties

| Depth | LOW | TOP | SURVEY |
|---|---|---|---|
| Surface to 1/4 inch | 12 | 17 | 6 |
| 1/4 to 3/4 inch | 30 | 11 | 27 |
| 3/4 to 1-1/4 inch | 47 | 34 | 45 |
| 1-1/4 to 2 inches | 6 | 28 | 17 |
| Over 2 inches | 6 | 11 | 5 |

The TOP group seeded the larger seed Argentine varieties deeper on the average as they used more airflow and hoe drills than did the LOW group.

II: Polish Varieties

| Depth | LOW | TOP | SURVEY |
|---|---|---|---|
| Surface to 1/4 inch | 14 | 10 | 13 |
| 1/4 to 3/4 inch | 22 | 64 | 40 |
| 3/4 to 1-1/4 inch | 54 | 18 | 35 |
| 1-1/4 to 2 inches | 5 | 8 | 11 |
| Over 2 inches | 5 | - | 1 |

The TOP groups using more double disc press drills on firm seedbeds had more control on depth of seeding and seeded shallower than the LOW group or the SURVEY.

FIELD OPERATIONS AFTER SEEDING:

| | LOW | TOP | SURVEY |
|---|---|---|---|
| Equipment after seeding | 41 | 48 | 41 |

Most of the equipment used after seeding were harrows, with some packers or rod-weeders.

Soil Moisture at Depth of Seeding After Seeding and/or Field Operations Following Seeding:

| Soil Moisture | LOW | TOP | SURVEY |
|---|---|---|---|
| Dry | 25 | 5 | 29 |
| Moist to Wet | 75 | 85 | 71 |

The TOP producers conserved more soil moisture with their seedbed preparation and seeding operations.

SEED SOURCE:

| | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Pedigreed Seed | 60 | 90 | 80 | 30 |
| Commercial Seed | 40 | 10 | 20 | 28 |

More of the TOP group used pedigreed seed, but remember, 20% of the TOP group were pedigreed seed growers versus only 5% of the LOW group. This fact would tend to narrow the percent difference, but would not eliminate it. Pedigreed seed contributes to higher yields as shown by the higher average yield for pedigreed seed in the survey.

SEED TREATMENT:

| | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| None | 40 | 10 | 18 | 28 |
| Dual | 25 | 75 | 62 | 31 |
| Insecticide | 20 | 15 | 14 | 30 |
| Fungicide | 15 | - | 7 | 29 |

More of the TOP group used a dual purpose seed treatment. The average yield for those in the survey using dual seed treatment was higher than for those only using a fungicide or an insecticide or none.

VARIETIES SOWN:

| | LOW | TOP | SURVEY |
|---|---|---|---|
| CANDLE | | | |
| Torch | 50 | 65 | 60 |
| Tower | - | - | 6 |
| Altex | - | - | 1 |
| Regent | 45 | 30 | 31 |
| | 5 | 5 | 2 |

The TOP group grew more Polish and less Argentine varieties.

SEEDING RATE:

| Polish Varieties | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Lbs/Ac - 2 to 4 | 5 | 14 | 9 | 32 |
| 4 to 5 | 36 | 50 | 32 | 31 |
| 5 to 6 | 23 | 27 | 32 | 30 |
| 6 to 7 | 18 | 5 | 13 | 28 |
| 7 + | 19 | 5 | 14 | 28 |

The TOP group seed lighter with an average 4 to 5 lbs/acre versus the LOW and SURVEY at 5 to 6 lbs/acre.

| Argentine Varieties | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Lbs/Ac - 2 to 5 | 22 | 16 | 20 | 26 |
| 5 to 8 | 61 | 50 | 65 | 29 |
| 8 + | 17 | 34 | 15 | 34 |

The TOP group seeded Argentine varieties heavier than the LOW or SURVEY.

DAYS TO EMERGE FROM SEEDING

I: Argentine Varieties:

| Days to Emerge | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Up to 7 days | 17 | 44 | 27 | 33 |
| 8 to 12 days | 51 | 50 | 48 | 30 |
| 13 + days | 32 | 6 | 25 | 25 |

II: Polish Varieties:

| | | | | |
|---|---|---|---|---|
| Up to 5 days | 9 | 27 | 16 | 32 |
| 6 to 9 days | 27 | 50 | 41 | 31 |
| 9 + days | 64 | 23 | 43 | 28 |

The TOP group, because of shallower seedbed preparation, fewer cultivations in the spring, use of harrows and packing equipment, achieved a seedbed with adequate moisture and oxygen for germination and growth of the developing seedlings. This, combined with a seeding rate for an adequate plant population, accurate seed placement in good contact with soil and moisture, seed treatment to protect the seed and growing seedling, meant the TOP group achieved a much faster germination and seedling emergence than did the LOW group, or the average in the survey. Fast seed germination and emergence led to high yields.

SOIL FERTILITY:

| SOIL TEST | LOW | TOP | SURVEY |
|---|---|---|---|
| Yes | 20 | 20 | 20 |
| No | 80 | 80 | 80 |

There was no difference in soil testing between groups. For those producers soil testing: 19% applied the recommended amount of nitrogen; 69% applied more (29 lbs/ac on the average); and 12% applied less (14 lbs/ac on the average). Average yields for those applying the recommended amount = 31 bu/ac; more = 30 bu/ac, and less = 26 bu/ac. If a soil test was not done for the 1981 crop, the SURVEY producers were asked to estimate what they felt was the nutrient level of their soil.

| Producer Estimates of Soil Condition | LOW | TOP | SURVEY |
|---|---|---|---|
| Nitrogen soil level: | | | |
| Had an opinion | 60 | 80 | 76 |
| Don't know | 30 | 20 | 24 |
| Phosphorus soil level: | | | |
| Had an opinion | 65 | 85 | 73 |
| Don't know | 35 | 15 | 27 |
| Potassium soil level: | | | |
| Had an opinion | 65 | 85 | 65 |
| Don't know | 35 | 15 | 35 |
| Sulphur soil level: | | | |
| Had an opinion | 60 | 70 | 63 |
| Don't know | 40 | 30 | 37 |
| Organic matter soil level: | | | |
| Had an opinion | 90 | 95 | 63 |
| Don't know | 10 | 5 | 37 |
| Soil pH: | | | |
| Had an opinion | 55 | 65 | 63 |
| Don't know | 45 | 35 | 37 |

The TOP group was more aware of their soil condition, possibly from previous soil tests and experience. This greater awareness of soil-plant requirements would enable the TOP group to more closely meet those requirements in their fertility program.

Applied Nitrogen on Summerfallow

| Pounds "N" per Acre | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Below 10 | 8 | 30 | 32 | 36 |
| 10 to 30 | 27 | 10 | 19 | 29 |
| 30 to 50 | 22 | 35 | 28 | 31 |
| 50 to 70 | 22 | 15 | 14 | 30 |
| 70 to 90 | 5 | 5 | 4 | 33 |
| 90 to 120+ | - | 5 | 3 | 36 |
| Average "N" applied | 25 | 30 | 27 | |

Not a large difference occurred between groups on the amount of nitrogen being applied on summerfallow with the TOP group applying slightly more.

Applied Nitrogen on Stubble

| Pounds "N" per acre | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Below 10 | 5 | - | 2 | 22 |
| 10 to 30 | - | - | 1 | 24 |
| 30 to 50 | 14 | - | 10 | 27 |
| 50 to 70 | 57 | 40 | 40 | 28 |
| 70 to 90 | 10 | 25 | 32 | 30 |
| 90 to 120+ | 14 | 35 | 15 | 33 |
| Average "N" applied | 56 | 77 | 65 | |

The TOP group applied more nitrogen on the average, but the difference is not sufficient to account for most of the large yield difference between TOP and LOW. When considering the SURVEY, a good response curve for yield occurs for each increase in nitrogen being applied on the average.

| Form of Nitrogen Applied on Summerfallow | LOW | TOP | SURVEY |
|---|---|---|---|
| Anhydrous Ammonia | 16 | 25 | 20 |
| Granular | 68 | 65 | 63 |
| Liquid | 5 | 5 | 8 |
| Other, and N.A. | 11 | 5 | 9 |
| **Time of Nitrogen Application** | | | |
| Fall | 11 | 40 | 17 |
| Spring | 32 | 35 | 36 |
| Spring, with seed | 46 | 25 | 40 |
| N.A. | 11 | - | 7 |
| **Deep-banded Nitrogen** | | | |
| YES | 16 | 45 | 29 |
| NO | 73 | 50 | 64 |
| N.A. | 11 | 5 | 7 |

The TOP producers applied only slightly more nitrogen but applied a greater percentage of it in the fall, and a greater percentage of it was deep-banded, than with the LOW group.

| Form of Nitrogen Applied on Stubble | LOW | TOP | SURVEY |
|---|---|---|---|
| Anhydrous Ammonia | 62 | 90 | 69 |
| Granular | 33 | 10 | 27 |
| Liquid | - | - | 3 |
| Other, and N.A. | 5 | - | 1 |
| **Time of Nitrogen Application** | | | |
| Fall | 43 | 60 | 48 |
| Spring | 62 | 40 | 49 |
| Spring, with seed | - | - | 2 |
| N.A. | 5 | - | 1 |
| **Deep-Banded Nitrogen** | | | |
| YES | 67 | 100 | 75 |
| NO | 28 | - | 24 |
| N.A. | 5 | - | 1 |

The TOP producers on stubble applied much more nitrogen on the average than the LOW group with a greater percentage as anhydrous, going on in the fall and being deep-banded.

The TOP group applied more nitrogen in the fall to save time on spring operations, eliminate one more spring seedbed drying operation, and usually nitrogen is cheaper in the fall with more readily available product and application equipment. Most TOP producers utilized the cheapest source of nitrogen - anhydrous ammonia.

**Applied Phosphourus ($P_2O_5$)**

| Pounds $P_2O_5$ per Acre | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| 0 to under 10 | 10 | 5 | 4 | 28 |
| 10 to 30 | 65 | 45 | 63 | 29 |
| 31 to 50 | 25 | 50 | 27 | 31 |
| 51 to 70 | - | - | 6 | 34 |
| Average | 17 | 28 | 23 | |

One-half of the TOP producers applied over 30 pounds per acre of $P_2O_5$ versus only one-quarter of the LOW group. This corresponds to the higher nitrogen use of the TOP group - balancing their crops requirements. Of those in the SURVEY who soil tested: 28% applied recommended rates of phosphorus with an average yield of 28 bu/ac; 13% applied less, yielding 28 bu/ac; and 59% applied more, yielding 29 bu/ac.

| Time of Phosphorus Application | LOW | TOP | SURVEY |
|---|---|---|---|
| None applied | 10 | 5 | 2 |
| Spring | 5 | 10 | 13 |
| Spring, with seed | 80 | 80 | 80 |
| Fall | 5 | 5 | 5 |

Phosphorus was mainly applied with the seed in a granular form. About 10% of the phosphorus was applied deep-banded for all groups.

Potassium Applied

| Pounds per Acre | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 75 | 65 | 64 |
| Under 10 | 15 | 20 | 11 |
| 10 to 30 | 10 | 15 | 20 |
| Over 30 | - | - | 5 |

The majority of survey producers did not apply potassium. The TOP producers who applied potassium used slightly more than the LOW producers. The potassium was applied as a granular fertilizer in the spring with the seed except for 4% of the survey who deep-banded it mainly in the spring.

Sulphur Applied

| Pounds per Acre | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 70 | 100 | 78 |
| Under 10 to 15 | 30 | - | 17 |
| Over 15 | - | - | 2 |

Very little sulphur was used. Where it was used, it was applied mainly in the spring with the seed in other nutrient fertilizer formulations. Only 3% of the survey applied elemental sulphur.

| STAND ESTABLISHMENT | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Uniform | 44 | 88 | 70 | 31 |
| Uneven | 33 | 10 | 23 | 28 |
| Patchy | 23 | 2 | 7 | 23 |

Causes for Uneven or Patchy Stand Establishment

| CAUSE | LOW | TOP | SURVEY |
|---|---|---|---|
| N. A. | 44 | 88 | 70 |
| Excessive moisture | 6 | 2 | 3 |
| Deficient moisture | 22 | 10 | 20 |
| Soil surface crusting | 6 | - | 1 |
| Depth of seeding | 2 | - | 1 |
| Mechanical problems | 2 | - | 2 |
| Low seed germination | 2 | - | 1 |
| Loose seedbed | 6 | - | 2 |
| Other | 6 | - | - |

Plant Population Density

| Plant Population per Square Foot | LOW | TOP | SURVEY |
|---|---|---|---|
| Light - 3 to 9 | 53 | 20 | 28 |
| Medium - 9 to 20 | 33 | 52 | 47 |
| Heavy - Over 20 | 7 | 23 | 17 |
| Don't know | 7 | 5 | 8 |

Average Yield for Different Plant Populations

| Plant Population | Polish On Summerfallow | Polish On Stubble | Argentine On Summerfallow | Argentine On Stubble |
|---|---|---|---|---|
| Light | 31 | 25 | 28 | 24 |
| Medium | 31 | 30 | 34 | 27 |
| Heavy | 32 | 30 | 35 | 33 |

| SEEDLING GROWTH AND VIGOR | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| Fast, Vigorous | 33 | 64 | 32 | 32 |
| Average, Normal | 49 | 33 | 56 | 29 |
| Stunted, Slow | 18 | 3 | 12 | 27 |

More TOP producers achieved a medium to heavy, vigorous, uniform stand that emerged quickly which correlates well with previous seedbed preparations, seeding rates, seeding dates, seed treatment, and seed source information.

Stand establishment, plant population and fast healthy growth is very important to canola production as the field's yield potential is set by this time. Environmental, nutritional and weed factors, through the remaining growing season, will determine the degree to which this potential is expressed in final yield, but the maximum potential has been set at the seedling stage.

Problem Weeds Before Herbicide Control Program

| WEEDS | LOW | TOP | SURVEY |
|---|---|---|---|
| None | - | 5 | 11 |
| Wild Oats | 65 | 10 | 60 |
| Canada Thistle | 65 | 45 | 39 |
| Chickweed | 15 | 20 | 34 |
| Hemp Nettle | 30 | 30 | 22 |
| Stinkweed | 10 | 20 | 19 |
| Buckwheat | 5 | 15 | 10 |
| Volunteer Cereals | 5 | 5 | 9 |
| Lady's Thumb | 10 | 10 | 8 |
| Pigweed | - | 5 | 8 |
| Wild Millet | 5 | - | 10 |
| Sow Thistle | 10 | 5 | 7 |
| Corn Spurry | 10 | - | 7 |
| Lamb's Quarter | - | 15 | 4 |
| Quackgrass | 5 | 10 | 4 |
| Cleavers | - | - | 3 |

Other weeds which were reported by SURVEY producers (less than 1%) were: Wild Mustard; Cow Cockle; Scentless Mayweed; Groundsel, and Volunteer Rapeseed.

Herbicides Applied the Previous Summer or Fall

| Herbicide | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 95 | 70 | 79 |
| Treflan Liquid | - | 20 | 9 |
| Treflan Granules | - | 5 | 8 |
| Avadex Granules | - | 5 | 2 |
| Avadex Liquid | - | - | >1 |
| Others | 5 | - | 2 |

The TOP producers applied more herbicides in the fall.

Herbicides Applied Pre-emergence in the Spring

| Herbicide | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 25 | 35 | 28 |
| Treflan Liquid | 65 | 50 | 59 |
| Treflan Granules | 10 | 10 | 8 |
| Avadex Granules | - | - | 2 |
| Avadex Liquid | - | - | 1 |
| Others | 10 | 5 | 2 |

Herbicides Applied Post-emergence in the Spring

| Herbicide | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 85 | 75 | 85 |
| Wild Oat Herbicide | 15 | 25 | 15 |

Total Herbicide Useage on Canola (Fall plus Spring)

| Herbicide | LOW | TOP | SURVEY |
|---|---|---|---|
| None | - | - | 5 |
| Treflan Liquid | 65 | 70 | 68 |
| Treflan Granules | 10 | 15 | 15 |
| Avadex Granules | - | 5 | 3 |
| Avadex Liquid | - | - | >1 |
| Avadex plus Treflan | - | - | 2 |
| Post-emergent after another herbicide | 5 | 20 | 9 |
| Post-emergent only | 10 | 5 | 6 |
| Other herbicides | 15 | 5 | 3 |
| TOTAL | 105% | 120% | 111% |

The majority of the producers used Treflan for weed control in canola (83%). The TOP group used more Treflan than the LOW group. The TOP producers also applied more post-emergent herbicides to control wild oat escapes from fall or spring applied herbicides. Only 5% of the SURVEY used no herbicides in their canola.

Effectiveness of the Herbicides Used

| | LOW | TOP | SURVEY |
|---|---|---|---|
| Poor | 25 | - | 11 |
| Fair | 8 | 13 | 12 |
| Good | 19 | 18 | 24 |
| Very Good | 47 | 68 | 53 |

The TOP group did not rate any herbicide effect as poor versus 25% of the LOW. Seventy-seven percent of the SURVEY growers rated their herbicides as good to very good, while the TOP rated 86% and the LOW only 66%.

The major reasons given for herbicides weed control being less than expected were: improper incorporation; ineffective herbicide; growing conditions and the herbicide being applied at the wrong stage of growth. Herbicide crop damage was reported only by LOW producers, where 15% reported some crop damage.

Rate of Weediness in the Early Seedling Stage

| | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| None to light | 55 | 95 | 77 | 31 |
| Moderate | 30 | 5 | 18 | 28 |
| Heavy | 15 | - | 5 | 24 |

Rate of Weediness in the Growing Crop

| | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| None to light | 50 | 90 | 75 | 31 |
| Moderate | 30 | 10 | 20 | 27 |
| Heavy | 20 | - | 5 | 22 |

The TOP producers rated their crop weediness as none to light, while the LOW producers rated their weediness as more moderate to heavy weed infestations. Fifty percent of the LOW group rated their weed infestations in the growing crop as moderate to heavy versus 10% in the TOP and 25% in the SURVEY.

Problem Weeds in the Growing Crop Causing Yield Loss

| WEEDS | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 15 | 30 | 29 |
| Canada Thistle | 45 | 45 | 42 |
| Wild Oats | 40 | 30 | 34 |
| Stinkweed | 10 | 20 | 18 |
| Chickweed | 20 | 15 | 18 |
| Hemp Nettle | 10 | 15 | 15 |
| Sow Thistle | 20 | 10 | 10 |
| Quack Grass | - | 15 | 6 |
| Volunteer Cereals | 5 | 5 | 5 |
| Buckwheat | 5 | 10 | 4 |
| Pigweed | - | - | 3 |
| Corn Spurry | 15 | - | 3 |
| Lady's Thumb | 5 | - | 3 |

Other weeds which were reported by SURVEY producers (less than 1%) were: Wild Mustard; Cow Cockle; Scentless Mayweed; Groundsel; Volunteer Rapeseed, and Wild Millet.

Fewer TOP producers reported yield loss from weeds. Canada Thistle; Wild Oats; Stinkweed, and Chickweed were the major weeds reported by the SURVEY producers.

Evaluation of Treflan Incorporation

The incorporation procedure of each producer was evaluated by considering time of application, type of implement used to incorporate, depth and speed of implement, and the number of incorporations.

| Treflan Incorporation | LOW | TOP | SURVEY |
|---|---|---|---|
| Satisfactory | 54 | 67 | 60 |
| Unsatisfactory | 46 | 33 | 40 |

Forty percent of all producers in the SURVEY improperly incorporated their Treflan. More TOP producers properly incorporated their Treflan than the LOW group.

Rating of Treflan Incorporation

| Rating | Weeds* | Herbicide** | Average Yield | Percent |
|---|---|---|---|---|
| Very Good | 1.7 | 7.5 | 30 | 21 |
| Good | 1.9 | 7.0 | 32 | 39 |
| Fair | 2.1 | 6.6 | 28 | 13 |
| Poor | 2.3 | 6.3 | 28 | 20 |
| Very Poor | 2.6 | 6.0 | 25 | 7 |

* Weed Rating: Producers rated their field's weediness as, 1 = none; 2 = light; 3 = moderate, and 4 = heavy.

** Herbicide Effectiveness:
Producers rated the effectiveness of the herbicide on a scale of 1 to 9, where 1 = poor and 9 = excellent.

Incorporations were rated very good where the Treflan Label was closely followed on: types of implements; number of incorporations; depth; speed, and time of application.

Incorporations were rated Good where one of the two incorporations were either too shallow or too deep. For those incorporations rated Fair, 90% of the incorporations were too shallow. For those rated Poor, 92% incorporated only one time. Many of these producers used harrows or rod-weeders as the second incorporation, or seeded with a hoe-drill, and felt that this would be adequate. The 7% who incorporated their Treflan - Very Poor - used single incorporations at a shallow or deep level, or used granules in the spring improperly incorporated.

As the incorporation rating goes from Very Good to Very Poor, the level of weeds increase significantly, the herbicide was rated as less effective, and the average yield dropped considerably.

The TOP producers are more aware of their weed problems, apply more herbicides properly - achieving better weed control and higher yields.

Problem Insects

| Insect | LOW | TOP | SURVEY |
|---|---|---|---|
| None | 65 | 70 | 73 |
| Flea Beetles | 25 | 25 | 23 |
| Bertha Armyworm | - | 5 | 1 |
| Diamond-Backed Moth | 5 | - | 1 |
| Root Maggots | 5 | - | 2 |

The majority of the SURVEY producers reported few insect problems with only 3% reporting significant yield loss from insects.

Disease Problems

Since the disease factor could have masked other management factors - the TOP and LOW groups were selected from those producers reporting no moderate to heavy disease damage. A considerable percentage of the SURVEY reported diseases.

| Disease | SURVEY |
|---|---|
| None | 44 |
| Root Rot | 4 |
| Sclerotinia | 35 |
| Blackspot | 2 |
| Staghead | 15 |

Crop Yield Loss Due to Disease

| | SURVEY |
|---|---|
| None to light | 83 |
| Moderate | 12 |
| Heavy | 5 |

Most producers in the SURVEY reported little yield loss due to diseases. The major disease causing yield loss as reported by producers was sclerotinia. Very few producers reported moderate to heavy damage to yield from diseases other than sclerotinia. Three

percent of the SURVEY producers used "Benlate" on their canola for sclerotinia control.

Of those producers growing Argentine varieties, 41% reported sclerotinia versus 33% for Polish varieties. For those reporting sclerotinia, the following occurred:

| Sclerotinia Damage to Crop Yield | Argentine Varieties | Average Yield | Polish Varieties | Average Yield |
|---|---|---|---|---|
| None to light | 46 | 30 | 72 | 30 |
| Moderate | 29 | 26 | 21 | 29 |
| Heavy | 24 | 22 | 8 | 22 |

Based on the producers who reported sclerotinia disease, yield loss was much greater in the Argentine varieties than in Polish varieties. The average yield of those producers who used Benlate was 32 bu/acre.

When asked if disease control is a major consideration when deciding what crop to seed on a particular field:

| | LOW | TOP | SURVEY |
|---|---|---|---|
| YES | 70 | 80 | 76 |
| NO | 30 | 20 | 24 |

The majority of the producers in the SURVEY consider disease a major factor when planning rotations.

| LODGING | LOW | TOP | SURVEY |
|---|---|---|---|
| None to Light | 70 | 40 | 56 |
| Medium to Heavy | 30 | 60 | 44 |
| Lodging Effect on Yield | | | |
| None to Light | 95 | 90 | 88 |
| Medium to Heavy | 5 | 10 | 12 |
| Is Lodging Resistant a Factor in Variety Selection? | | | |
| YES | 25 | 45 | 30 |
| NO | 75 | 55 | 70 |

The effect on yield from lodging is not as great as the amount of lodging. The TOP producers with their higher yielding crops had more medium to heavy lodging. The majority of producers in the SURVEY felt that seeding rate had no effect on lodging. The TOP producers could clearly benefit from a stronger straw, high-yield variety, or a semi-dwarf, high-yield variety.

## HARVESTING

The majority of producers swathed their canola before combining. Two percent of the SURVEY straight combined.

| Seed Moisture Content at Swathing: | LOW | TOP | SURVEY |
|---|---|---|---|
| Less than 15% | 20 | 16 | 8 |
| 15 - 25% | 40 | 26 | 47 |
| 25 - 30% | 15 | 16 | 21 |
| 30 - 35% | 15 | 21 | 13 |
| 35+% | 10 | 21 | 11 |

More TOP producers swathed earlier at a higher seed moisture. Maximum seed and oil yield from canola can be obtained by swathing plants when the seeds contain between 25 to 35% moisture on the average. Swathing earlier (around 40-45%) will result in yield loss and/or off-grades due to green seeds. Swathing later will increase shatter losses before/and during swathing.

| Shatter Losses | LOW | TOP | SURVEY |
|---|---|---|---|
| None to Light | 88 | 95 | 89 |
| Moderate | 12 | 5 | 11 |

Considering a normal dry down rate for canola of 2% moisture a day, under normal dry weather, many of the SURVEY producers could have swathed 5 to 7 days earlier, saving on shatter losses as well as cutting down on frost risk damage to the crop.

Swath in the Direction of the Wind

| | LOW | TOP | SURVEY |
|---|---|---|---|
| YES | 55 | 55 | 51 |
| NO | 45 | 45 | 49 |

Date of Swathing

Maturity, and therefore swathing date, depends upon many factors: seeding date; variety grown; weather during the growing season, and at harvest; soil fertility; crop rotation - summerfallow or stubble; location of field in the province; north or south slope to the field; disease and insect damage; weed competition, and seeding rate, etc.

Swathing Date - Argentine Varieties

| DATE | LOW | TOP | SURVEY |
|---|---|---|---|
| Before August 15th | 17 | 11 | 14 |
| August 16th - 29th | 34 | 17 | 34 |
| August 30-September 5th | 28 | 44 | 25 |
| September 6th - 12th | 17 | 22 | 22 |
| September 13th + | 6 | 6 | 5 |
| Average days to swathing from seeding | 105 | 110 | 105 |

Seeding Date Affected Maturity

| Seeding Date | Days to Swathing | Average Yield |
|---|---|---|
| Before May 2nd | 123 | 30 |
| May 3rd - 9th | 111 | |
| May 10th - 16th | 104 | |
| May 17th - 23rd | 103 | 29 |
| May 24th - 30th | 92 | |

Earlier sown Argentine varieties required more days to swathing than later sown varieties. Remember that 72% of the TOP producers seeded before May 16th versus 56% in the LOW group. More of the TOP producers also swathed later than the LOW producers, showing that their canola took longer to mature (110 days versus 105 days). On the average a TOP producer seeding on May 10th would usually swath around August31st in those areas suitable for Argentine varieties and later in marginal areas for Argentine varieties.

| Days to Swathing | Average Yield | Percent |
|---|---|---|
| 80 - 95 | 27 | 15 |
| 95 - 110 | 30 | 39 |
| 110 - 125 | 30 | 39 |
| 125 + | 34 | 7 |

Swathing Date - Polish Varieties

| DATE | LOW | TOP | SURVEY |
|---|---|---|---|
| Before August 15th | 23 | 19 | 13 |
| August 16th - 29th | 36 | 36 | 40 |
| August 30th-September 5th | 14 | 23 | 17 |
| September 6th - 12th | 18 | 9 | 15 |
| September 13th + | 18 | 14 | 15 |
| Average Days to Swathing from Seeding | 97 | 99 | 99 |

Seeding Date Affected Maturity

| Seeding Date | Days to Swathing | Average Yield |
|---|---|---|
| Before May 2nd | 119 | 30 |
| May 3rd - 9th | 111 | |
| May 10th - 16th | 105 | |
| May 17th - 23rd | 100 | 31 |
| May 24th - 30th | 98 | |
| May 31st to June 6th | 93 | 29 |
| June 7th to June 11th | 80 | |

| Days to Swathing | Average Yield | Percent |
|---|---|---|
| Up to 80 | 29 | 5 |
| 80 - 95 | 31 | 28 |
| 95 - 110 | 30 | 42 |
| 110 - 125 | 31 | 19 |
| 125 + | 31 | 6 |

More TOP producers seeded their Polish varieties (54%) between May 17th and May 30th. These seeding dates for the SURVEY also resulted in the highest average yield for Polish varieties. Producers seeding around May 24th would usually be able to swath around August 31st.

Average Maturity for the Survey Districts

| District | Polish Varieties Maturity | Polish Varieties Range | Argentine Varieties Maturity | Argentine Varieties Range |
|---|---|---|---|---|
| Athabasca | 95 | 69 - 112 | - | - |
| Barrhead | 100 | 98 - 105 | 95 | 85 - 104 |
| Westlock | 94 | 84 - 106 | 98 | 80 - 112 |
| Thorhild | 86 | 69 - 98 | 119 | 119 |
| Smoky Lake | 85 | 71 - 98 | 108 | 98 - 119 |
| Morinville | 97 | 64 - 112 | 104 | 90 - 119 |
| Lamont | 96 | 91 - 98 | 101 | 91 - 112 |
| Two Hills | 105 | 98 - 111 | 120 | 106 - 134 |
| Stony Plain | 91 | 77 - 105 | 100 | 91 - 112 |
| Sherwood Park | 89 | 76 - 112 | 104 | 84 - 119 |
| Vegreville | 95 | 91 - 98 | 98 | 98 |
| Leduc | 84 | 70 - 98 | 112 | 98 - 126 |
| Camrose | 91 | 83 - 91 | 105 | 105 |
| Ryley | 91 | 84 - 98 | 98 | 84 - 105 |
| Rimbey | 114 | 91 - 126 | 112 | 106 - 119 |
| Wetaskiwin | 97 | 76 - 139 | 122 | 119 - 126 |
| Ponoka | 99 | 83 - 132 | 116 | 112 - 119 |
| Rocky Mtn. House | 115 | 111 - 125 | - | - |
| Lacombe | 102 | 84 - 125 | 128 | 118 - 141 |
| Red Deer | 97 | 84 - 112 | 112 | 112 |
| Innisfail | 104 | 84 - 132 | - | - |
| Olds | 102 | 84 - 126 | - | - |
| Three Hills | 126 | 126 | 109 | 100 - 119 |

Days to mature for both Polish and Argentine varieties varied considerably for each district.

Yield Losses at Combining

| | LOW | TOP | SURVEY |
|---|---|---|---|
| None to Light | 90 | 100 | 88 |
| Moderate | 10 | - | 12 |

Combining losses were not large for either group.

Seed Moisture Content When Combined

| Percent Moisture | LOW | TOP | SURVEY |
|---|---|---|---|
| Below 8% | 25 | 40 | 35 |
| 8 - 9% | 45 | 45 | 40 |
| 9 - 10% | 20 | 10 | 16 |
| 10 - 11% | - | 5 | 4 |
| Above 11% | 10 | - | 5 |

More TOP producers combined their canola below 8% seed moisture - safe for long-term storage. Safe long-term storage for canola is 7 to 8% seed moisture content, and safe short-term storage (one to two months) is 9 to 10%, depending on temperature at time of combining (this moisture level is too high for safe storage at high seed temperature). The majority of producers combined between 8 to 10% seed moisture. Grain drying as a management tool was not greatly used in 1981 as the harvest weather was generally excellent.

| Heating Damage | LOW | TOP | SURVEY |
|---|---|---|---|
| NO | 90 | 95 | 94 |
| YES | 10 | 5 | 6 |
| **Yield in Bushels Per Acre** | | | |
| 1981 Average Yield | 21 | 40 | 30 |
| 5-year Average Yield | 24 | 32 | 30 |
| Average Best Yield | 34 | 42 | 39 |

The TOP group had consistently high yields and a 91% yield increase over the LOW group in 1981.

| DOCKAGE | LOW | TOP | SURVEY | AVERAGE YIELD |
|---|---|---|---|---|
| 0 - 4% | 10 | 70 | 33 | 31 |
| 4 - 8% | 40 | 20 | 43 | 29 |
| 8 - 18+% | 50 | 10 | 24 | 26 |
| Average Percent | 9.4 | 3.7 | 5.0 | |

More TOP producers achieved a low dockage versus nearly 50% of the LOW with a dockage greater than 8%. Remember the greater weediness in the LOW group.

## Grades Achieved

Because of the generally excellent harvesting weather in 1981 the majority of the producers reported top grades for their canola or had not yet marketed any of their crop. The major reasons given for possible down-grading of their canola was, immaturity (green seeds or shrivelled seeds); weed seed contaminants, and/or disease.

Percent green seeds was a problem with over 15% of the SURVEY reporting greater than 2% green seeds in their canola. As there were no early frosts in 1981, this was the result of combining too early. Three or more additional days in the swath would normally be adequate to allow the green seeds to change color for canola swathed at the proper maturity stage.

Two general interest questions were asked:

1) with no change in current available varieties, and given good markets and prices, what percent increase in yield do you feel could be achieved per current cultivated acre on your farm for canola?

| Yield Increase | LOW | TOP | SURVEY |
|---|---|---|---|
| 0% | 10 | 15 | 10 |
| 1 - 5% | 5 | 35 | 19 |
| 5 - 10% | 10 | 15 | 23 |
| 10 - 15% | 25 | 20 | 15 |
| 15 - 20% | 25 | 15 | 14 |
| 20 - 25% | 10 | - | 12 |
| 25 - 30% | - | - | 3 |
| 35 - 40% | 5 | - | 1 |
| Over 40% | 10 | - | 2 |

2) by what major change in your present practices could the above yield increase be made in canola?

| Changes in Practices | LOW | TOP | SURVEY |
|---|---|---|---|
| Increase soil fertility | 40 | 25 | 29 |
| Control of weeds | 15 | 5 | 20 |
| Improved Cultural Practices | 20 | 20 | 18 |
| Control of disease | 10 | 25 | 12 |
| Control of insects | - | 5 | 4 |
| Better machinery | | 5 | 3 |
| Folier Fertilizer Application | 5 | 5 | 2 |
| Other | 10 | 10 | 12 |

Summary of Trends Indicated by the Survey Results

TOP Producers:

1) Never grow canola on canola stubble even with a year of summerfallow in between.
2) Can achieve high yields on all soil types.
3) Grow varieties which are adapted to the limitations of their location.
4) Use more minimum tillage practices.
5) Do as much fall work as possible to free valuable spring time, i.e. apply nitrogen, treflan, etc.
6) In the spring, on summerfallow, use fewer tillage operations and more packing operations with harrows, packers and rodweeders.
7) In the spring, on stubble, use fewer tillage operations at a shallow depth and more packing operations with harrows, packers and rodweeders.
8) Use more attachments such as harrows on their tillage equipment.
9) On stubble use cultivation practices which achieve a firm seedbed with moisture near the surface.
10) Seed their Argentine varieties before May 16th.
11) Seed their Polish varieties in the last two weeks of May.
12) Can use any seeding method and achieve high yields.
13) Seed at more accurate depths - deeper for Argentine varieties, and shallower for Polish varieties.
14) Use pedigreed seed.
15) Use a dual purpose fungicide-insecticide seed treatment.
16) Seed at lighter rates for Polish varieties - 4 to 5 lbs/acre.
17) Seed at heavier rates for Argentine varieties - 7 to 8 lbs/acre.
18) Achieve quick emergence of seedlings after seeding.
19) Are more aware of their soil conditions and use high rates of nitrogen and phosphorus. Use anhydrous ammonia as their source of nitrogen.
20) Achieve a uniform stand, with adequate plant numbers per square foot that are vigorous and healthy.
21) Use more herbicides - properly applied - achieving better weed control.
22) Swath at the proper growth stage of the crop.
23) Combine at lower seed moisture levels for insured safe storage.
24) Achieve lower dockage levels in their canola.